September-October 1988

FAA Aviation NEWS

A DOT/FAA FLIGHT STANDARDS SAFETY PUBLICATION

Post Maintenance Preflight, p. 8

Photo courtesy of PAMA News

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U.S. Department of Transportation

Federal Aviation Administration

FAA Aviation NEWS

September/October 1988
Volume 27, Number 5

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BRIEFS

FITNESS AND FLIGHT. Coronary heart disease is the leading cause of incapacitation in flying accidents in general aviation, according to statistical studies published by FAA's Civil Aeromedical Institute. A review of the period from 1975 through 1982 disclosed that approximately 13 accidents per year involved cardiovascular incapacitation--the majority fatal. In general, susceptibility increased with age, although pilots aged 40-49 had more accidents associated with coronary disease then pilots aged 50-59. The Office of Aviation Medicine emphasizes the importance of pilots maintaining overall good health and flying only when feeling completely well.

RESISTING WATER CHILL. Transport Canada medical authorities are advising pilots that the best means of staving off hypothermia following accidental immersion in cold water is a tuck position. Keeping the knees drawn up, the upper arms close to the sides of the body, and the head out of water, may increase survival time as much as 50% The so called "drown-proof" position (restful floating) is not recommended in cold water, primarily because it allows very rapid heat loss from the head.

FLOATS FLOTSAM. Disintegration of the float used to signal the fuel level in aircraft tanks has been reported by owners of numerous types of single-engine Cessnas. This leads not only to erroneous gauge readings but also--and with greater hazard--to particle contamination of the fuel. The problem appears to be associated with fuel containing aromatics, such as 100 low lead aviation fuel and unleaded auto gas. Pilot using such aircraft fuel should be on the alert for small black particles when examining fuel samples drained from tanks, sumps, and gascolaters.

QUESTIONS PLEASE. The written test question books, which were issued in 1986, expire on September 1, 1988. The FAA has issued a new series of questions to replace the obsolete set. For a listing of the new test question books containing cost and ordering information, see Advisory Circular 60-20, "Announcement of Availability: New Series Written Test Question Books." It is available free from DOT Distribution Unit, M-443.2, Washington, DC 20590.

U.S. Department of Transportation

Federal Aviation Administration

Office of the Administrator

800 Independence Ave., S.W.
Washington, D.C. 20591

July 28, 1988

Dear Fellow Pilot:

Our new regulation on the required use of Mode C altitude encoding transponders, which was published in the Federal Register on June 21, 1988, is a crucial rule change for general aviation. FAA was mandated by Congressional legislation to devise and publish, within a relatively short time-frame, a rule that would substantially reduce the potential risk of midair collisions for aircraft that are under air traffic control.

For all of us who fly often in a heavily trafficked area, the presence of aircraft whose altitude and intentions are unknown to ATC creates an unacceptable risk of midair collisions or near-midair incidents and unnecessary risks to pilots and passengers. These unknown factors place an intolerable burden on the shoulders of our air traffic controllers. We at FAA were assigned to resolve this problem with the means currently available to the aviation public--namely, the Mode C or altitude reporting transponder.

This equipment is reasonably priced and may be installed on all aircraft with an engine-driven electrical system. Aircraft not equipped with Mode C may request ATC authorization to conduct operations on a case-by-case or long term basis. Aircraft without electrical systems, e.g., gliders, balloons, etc., are exempted from the rule in certain areas. The requirements of the Mode C rule are essentially simple and should not hinder the progress of general aviation flying. The FAA's initial proposed rule, published in February of this year, was more restrictive (in my opinion) than necessary. In order to develop a more balanced Mode C rule, the FAA began to consider a modification to the NPRM. At the same time, nearly 65,000 comments were received requesting the same.

I believe that the less restrictive final rule can work, provided that everyone in aviation takes the time and makes the effort to understand it--and to comply with it. That is why I am personally requesting that you study the information that follows. You will notice that there are two distinct effective dates.

For the earliest effective date, July 1, 1989, the Mode C rule applies to aircraft operating within a 30 nautical mile radius of a Terminal Control Area (TCA) primary airport and in the enroute segment of flight at and above 10,000 feet MSL. Effective on December 30, 1990, Mode C is required within and above an Airport Radar Service Area (ARSA) and in the airspace above and around certain designated airports (Billings, MT and Fargo, ND).

After studying the accompanying text, if you still have questions about the new rule, feel free to contact any Air Traffic field facility or Flight Standard District Office for assistance. You might also wish to touch base with the nearest Accident Prevention Specialist or Counselor, regarding the scheduling of pilot forums on this subject during the time we have before the rule takes effect.

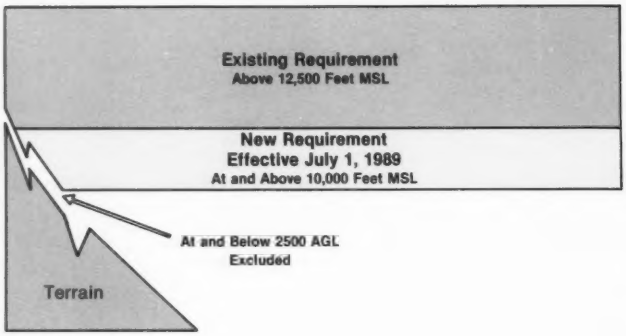
Sincerely,

T. Allan McArtor
Administrator

MODE C TRANSPONDER REQUIREMENTS

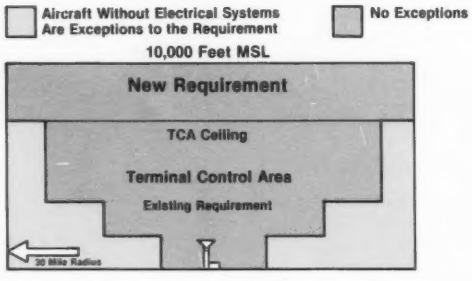
EN ROUTE FLIGHT

When	As of July 1, 1989
Who is affected	All aircraft flying in the adjoining 48 states and the District of Columbia.
Where	At and above 10,000 feet mean sea level (MSL) except in that airspace which is below 2,500 feet above ground level (AGL).
Exceptions	Gliders, balloons, and other aircraft without an electrical system are excepted below the Positive Control Area (commonly at 18,000 feet MSL).
Note:	See following definitions of airspace which may be encountered en route and in which Mode C equipment is required.



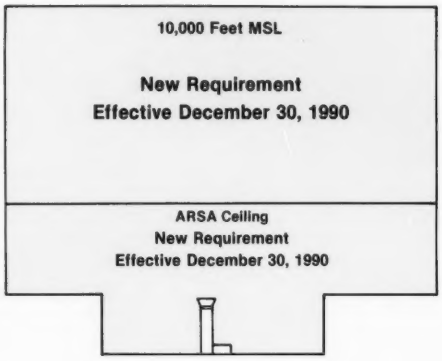
TERMINAL CONTROL AREAS

When	As of July 1, 1989
Who is affected	All aircraft operating within a 30 NM radius of a TCA primary airport, from the surface to 10,000 feet MSL.
Exceptions	Within the airspace outside of the lateral boundaries and/or below the floors of a TCA, gliders, balloons, and other aircraft without an electrical system are excepted.



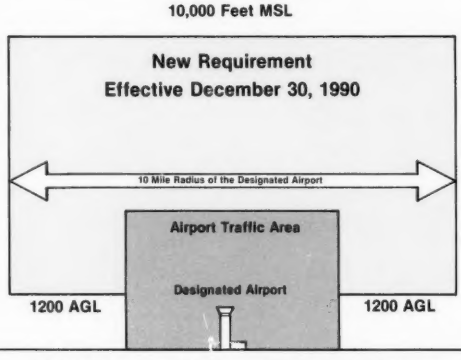
AIRPORT RADAR SERVICE AREAS

When	As of December 30, 1990
Who is affected	All aircraft operating within and above an ARSA, up to and including 10,000 feet MSL.
Exceptions	None



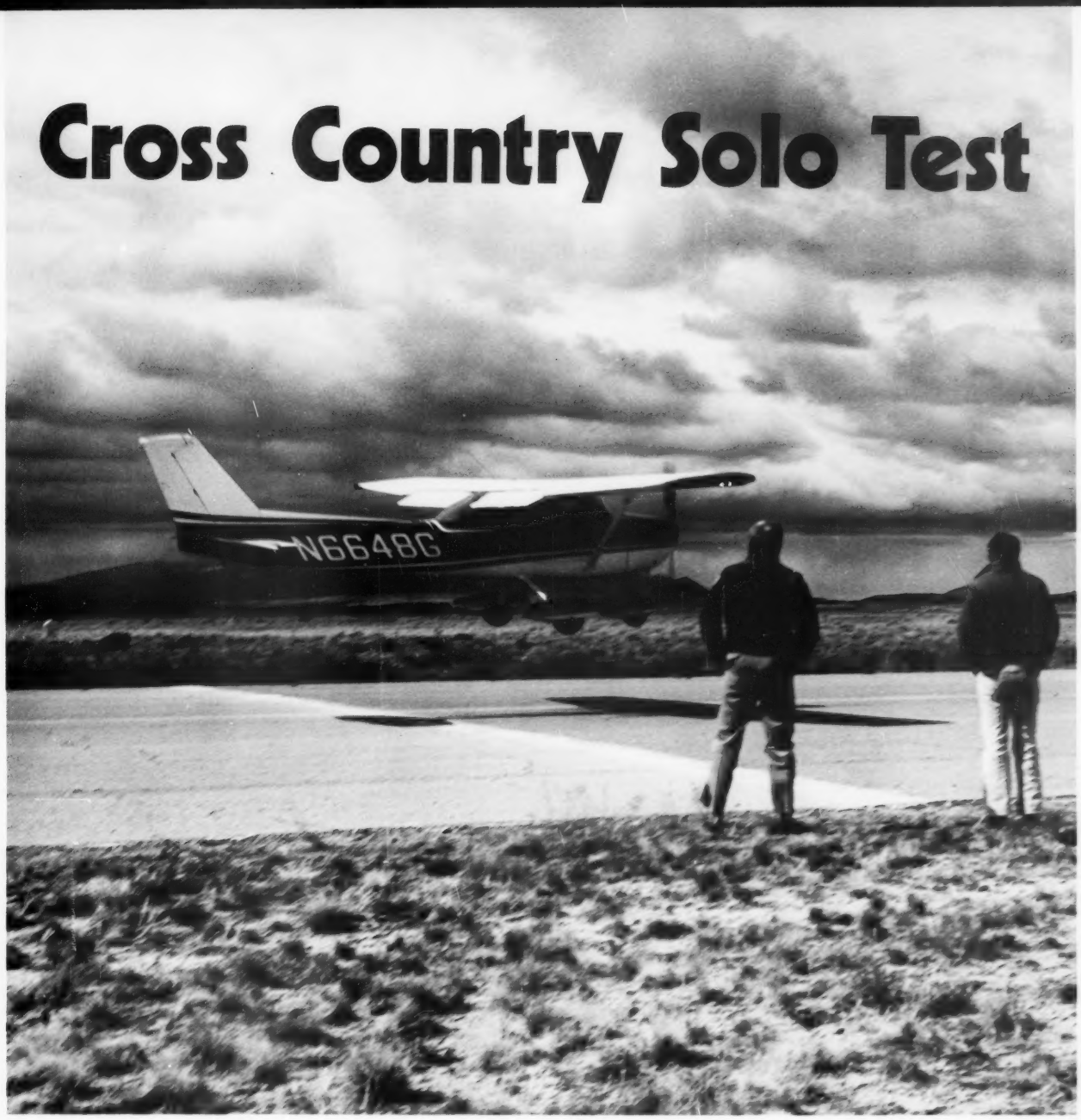
DESIGNATED AIRPORT AREAS

When	As of December 30, 1990
Who is affected	All aircraft flying within a 10 mile radius of specially designated airports (currently only Billings, MT and Fargo, ND). Designated airspace extends from the surface to 10,000 feet MSL, excluding the airspace which is outside of the Airport Traffic Area and below 1,200 feet AGL.
Exceptions	Gliders, balloons, and other aircraft without an electrical system are excepted.



GENERAL NOTE: Deviations from all of the above provisions may be authorized by the controlling ATC facility on a case-by-case basis. These may include agricultural aircraft operations, medical emergencies, aerial photography, approaches and departures from airports underlying controlled airspace, etc. There is nothing in this rule that would change the operational rules for ultralights.

Cross Country Solo Test



Your student appears ready for his (or her) first solo cross country flight. You have discussed the route, the flight environment, the FAA facilities, the weather, etc. The neophyte pilot appears capable and competent—but how can you be sure?

Most instructors will agree that this is a judgement call, based on their training and experience with students. In most instances, the flight is carried out without incident. But not always, and whenever there is a harmful incident or accident on this kind of flight there is a tendency to fault the instructor.

One form of insurance against unwarranted blame is the type of pre-solo cross country written examination prepared by Al Passell, an instructor with Eastern Cincinnati Aviation in Batavia, OH. Before they can fly solo cross country, he requires all of his students to answer 40 questions, which measure the students familiarity with aircraft management, pertinent FAA regulations, appropriate use of FAA facilities, radio weather aids, weather science, etc. The written (and graded) exam is then discussed with the student and is retained by the instructor.

This test, which is reproduced below, has helped Al avoid approving solo cross country for students who appeared to be confident and have the desired skill at the controls, but who were seriously deficient in their knowledge of how to use the airspace system, how to read sectional charts, how to deal with emergencies, etc. Such quizzes are not endorsed by FAA. Their value should be determined individually by instructors and students alike. ■

EDITOR'S NOTE: The test is reprinted with permission from the book, "To Teach a Pilot to Learn to Fly," by A. Passell, Eastern Cincinnati Aviation, Batavia, OH 45113. The book includes written quizzes like the following 40 questions.

STUDENT PRE-SOLO CROSS COUNTRY WRITTEN EXAMINATION

1. The usable fuel capacity of the aircraft to be used in my cross country flight is _____ gallons.
2. The hourly fuel consumption at 75% power at 4,000 feet (a conservative situation) is _____ gallons.
3. According to regulations, upon arrival at my destination, during daylight hours, I must still have _____ minutes of available fuel. If I plan to arrival for night, I must have a _____ minutes reserve.
4. Must a VFR flight plan be filed? _____ If so, with whom? _____
5. What FAA facilities can activate your flight plan once the flight has begun? _____
What is one frequency that may be used locally _____
6. What FAA facility should be contacted prior to entering a TRSA? _____
(though not mandatory, it is a very good idea.)
7. What FAA facility, if any, must be contacted before entering an ARSA or a TCA? _____
8. Prior to reaching what distance from a tower controlled field should a pilot contact the tower? _____ statute miles
9. What is normally the pattern altitude at airports? _____
10. What publication should be consulted to determine a recommended traffic pattern at the destination airport? _____
11. From whom can this information be obtained while airborne (in the event it is necessary to change the destination)? _____
12. In the event a pilot is unable to determine or obtain any frequencies from a publication, while airborne, what standard frequency might be used to obtain assistance? _____ MHz
13. From the manual of the airplane to be used on your cross country flight, determine the landing distance required to land at 4,000 feet MSL, with a temperature of 90 degrees F., and a headwind component of 6 knots. _____ feet
14. What is the no wind range of this aircraft, using 65% of the power at 6,000 feet? _____ nm.
15. According to FARs, define the VFR visibility minimums for entering or departing, or flight within the following segments of airspace: Control Zone _____, Uncontrolled Airspace below 10,000 MSL _____, Controlled Airspace less than 10,000 MSL _____, Controlled Airspace above 10,000 MSL _____.
16. According to FARs, define the VFR cloud clearance requirements for the following segments of airspace. (above, below, and horizontal):
Controlled and Uncontrolled Airspace above 10,000 MSL (except below 1,200 AGL) _____, _____, _____. Controlled Airspace below 10,000 MSL _____, _____, _____. Control Zone (ceiling requirement) _____
17. If the flight school, or the flight instructor has cross country weather minimums other than those mandated by Federal Aviation Regulations, the minimum ceiling is _____ feet AGL, the minimum visibility is _____ miles the maximum surface wind velocity is _____ knots.
18. In what airspaces do military activities restrict or prohibit the use by non-participating (NON-military) traffic? _____
19. When should the heading indicator be set relative to the magnetic compass? _____
How often should it be rechecked? _____
20. At what distance from a UNICOM equipped field should an announcement be made requesting traffic advisory? _____ miles
21. Should further reports be made than the above (in question 20)? _____ When? _____
22. If flight plan is filed, should Flight Service be notified if an alternate course of action is taken (other than that which was filed) or if the ETA is changed? _____
23. If you become disoriented during flight, from which FAA facilities could you obtain assistance? _____
24. Describe what plan of action you might take if no radio assistance could be reached, and you are "temporarily disoriented" (lost)? _____
25. List the order of the radio facilities to be used in flying into a TRSA or an ARSA, or a TCA. _____, _____, _____, _____.
26. List the order of the radio facilities to be used in departing a TRSA, or an ARSA or a TCA. _____, _____, _____, _____, _____.
27. From what facilities can one obtain weather information before departure? _____
While enroute? _____
28. What typical weather conditions might be encountered near a cold front? _____
29. What classic weather conditions might be encountered ahead of a warm front? _____
30. On a sectional chart, where does one obtain information regarding the height of terrain and obstructions? _____
31. On what radio aids are Transcribed Weather Broadcasts obtained? _____
32. Must a logbook endorsement be obtained from a CFI before departing on any cross country flight? _____
33. Must a student's pilot certificate be endorsed before he can undertake cross country flights? _____
34. What procedure should be followed if the engine fails while in flight? _____
35. To locate one's position, while using a VOR, should the TO or the FROM indication be indicated? _____
36. How can one determine if a VOR is out of service? _____
37. What is the significance of a blue colored airport on a Sectional Chart? _____
38. From which rules may a pilot deviate, to the extent required to meet an emergency? _____
39. If such a deviation is required (question 38) whom must a pilot notify? _____
40. According to regulations, how long may a pilot fly at cabin pressure altitudes between 12,500 and 14,000 feet MSL without using supplemental oxygen? _____

Runway Incursions

When airmen think of collisions between aircraft, we typically think of midair collisions or near midair incidents. The article on page 3 , an open letter from FAA's Administrator, talks about what we can do and what is being done to help reduce the probability of collisions in the air. Mr. John Doster, manager of FAA's Flight Standards District Office in Allentown, PA, offers some simple, down-to-earth advice on the "stepchild" of collisions, the runway incursion that could lead to a collision on the ground.

Perhaps the word "incursion" was first used in an aircraft accident investigation after the accident at Tenerife in the Canary Islands. Dictionaries define incursion as "a hostile entrance into a territory." Hostile is defined as "relating to an enemy." I couldn't quite see how "incursion" related to aircraft accidents, and if a new danger was developing, I hoped for a better description to drive home the safety message. Before Tenerife, ground collisions had not been one of the serious risks in aviation, and even afterwards it became easy to assume that the probability of this happening again would be minor. However, time is showing us that the danger exists, and the word "incursion," implying a hostile entrance, was well-chosen.

In March 1977 two B-747's waited out adverse weather at Tenerife. As the surface weather improved, both captains prepared for departure even though fog prevented anyone from pinpointing the exact position of the two huge aircraft in relation to the runway to be used. One captain initiated departure with the understanding that the runway was clear. The other captain taxied his aircraft onto the same runway, and a collision on the ground occurred. Five hundred and eighty-three people lost their lives. In spite of this, I joined those who thought that such an improbable event would not happen again. Then the word "incursion" took on a newer meaning for me.

I was on leave and flying alone in an airplane in which I had an interest. I arrived at an extremely busy airport after dark on a clear, beautiful night. The panorama of the airport and the surrounding city was such that many airplanes were being cleared for visual approaches as soon as they had the field in sight. I was asked to land long and turn off on a taxiway at the runway's end. My destination on the airport was about two miles from that point and across two parallel, active runways.

Approaching the first runway, I received clearance to cross, and I dutifully kept moving. Glancing to my left before crossing the first of the parallel active runways, I saw the lights of a large airplane on the runway, but I was unable to detect any movement. Then, the landing lights flickered in a manner that set off some sort of alarm in me, and I immediately stopped with the nose of my airplane extending slightly onto the runway. The right wing of a large, four engine airplane passed over my airplane, just inches from my head. Apparently the flight crew and the tower personnel recognized the danger at the same instant I did because for a second or two there was total silence on the radio frequency. Then, I was cleared to continue to taxi and within a few moments, everything was back to normal. I have not dramatized this incident to suit any safety message; it was one of those rare moments of stark terror.

Incursion—I find my respect for the word no longer in question. Every airport is growing at an unprecedented pace. Congestion

(continued on back cover)

Post Mainten

PILOTS, TAKE NOTE:

REMEMBERING THE FORGOTTEN MECHANIC

Through the history of world aviation
many names have come to the fore.
Great deeds of the past in our memory will
last, as they're joined by more and more.
When man first started his labor in his
quest to conquer the sky,
He was designer, mechanic, and pilot, and
he built a machine that would fly.
But somehow the order got twisted, and then
in the public's eye
The only man that could be seen was the
man who knew how to fly.
The pilot was everyone's hero; he was brave,
he was bold, he was grand
As he stood by his battered old biplane with
his goggles and helmet in hand.
To be sure these pilots all earned it. To fly
you have to have guts.
And they blazed their names in the hall of
fame on wings with baling wire struts.
But for each of these flying heroes, there
were thousands of little renown,
And these were the men who worked on the
planes but kept their feet on the ground.
We all know the name of Lindbergh, and
we've read of his flight to fame.
But think, if you can, of his maintenance
man; can you remember his name?
And think of our wartime heroes, Gabreski,
Jabara, and Scott.
Can you tell me the names of their crew
chiefs? A thousand to one you cannot.
Now pilots are highly trained people, and
wings are not easily won.
But without the work of the maintenance
man our pilots would march with a gun.
So when you see mighty aircraft as they
mark their way through the air,
The grease-stained man with the wrench in
his hand is the man who put them there.

— Anonymous

Reprinted from the Alaskan Region "Intercom" and the "General Aviation Airworthiness Alerts."

Your airplane has just come out of major maintenance—perhaps an annual inspection—and you feel extremely confident about the well-being of your "bird." After all, it has just been carefully worked over by a federally certificated aircraft mechanic. It is the same feeling you have when you leave the doctor's office with a clean bill of health after a full physical. After an in-depth inspection, your airplane also has a clean bill of health, right?

Well, people have been known to drop dead a few days after a successful physical.

In the overwhelming majority of cases, when maintenance has been performed on an aircraft, the owner or operator can rest assured that the airplane is completely airworthy. NTSB statistics bear this out. Each year only about 5% of all general aviation accidents have as a cause/factor some form of improper maintenance performed by maintenance personnel. In NTSB's latest annual computation of general aviation statistics (1985), only 133 of the 2,741 accidents were caused by improper maintenance.

However, that low figure is of small consolation if yours is one of the aircraft involved in an accident because a mechanic made a rare mistake.

Is there anything a pilot can do to check a mechanic's work *after* maintenance and *before* the pilot takes the airplane up?

The most important thing a pilot can do in this instance is to perform an extremely diligent preflight before the first post-maintenance flight, perhaps even more diligent than he or she would ordinarily do. After all, the airplane has been opened up extensively, particularly in the case of required inspections. You, the pilot, want to make sure that everything has been put back together properly. Even though you may not have been certificated as a maintenance airman, a good preflight will give you some vital clues.

The airplane's approved flight manual or a maintenance manual for the airplane contains the outline for an excellent preflight inspection. You should study this and note what to look for, then discuss what you plan to do with your mechanic. Many maintenance firms today assign a mechanic to go over the post-maintenance preflight with the pilot or even take a check flight with the pilot.

The actual preflight should include a careful inspection of all exterior parts for security—wires, panels, struts, etc. Then you should perform an engine runup of sufficient length to study the gauges—oil pressure, temperature, mag check, etc. After engine shut down, you should look over the engine and the engine compartment for any signs of unexplained moisture, gas, or oil. (Note that some aircraft may have to be uncowled to do this.) Any discrepancies you find should be discussed with the mechanic *before* you fly the airplane.

Here are a few instances from NTSB files where some pilots took up airplanes shortly after maintenance only to find a serious deficiency, which might have been detected on the ground.

- The pilot of a Cessna 177 was flying along a beach in southern Florida. The CE-177 had only 1.1 hours of flying time since its annual inspection. During that inspection an overhauled engine had been installed. The pilot and three passengers were enjoying the flight on a clear day when the Lycoming engine started to lose power steadily. Without power and with no place to land, the pilot carefully ditched the airplane in shallow water near the shoreline. Fortunately, all four people on board were able to evacuate safely. The airplane was later recovered, and accident investigators discovered that the fuel line from the fuel servo unit to the fuel divider was loose. There was evidence of fuel spray patterns on the inside of the lower engine cowling. NTSB concluded that fuel starvation from improper maintenance was the probable cause of the accident.
- An experienced Midwest pilot had just taken off in his Piper *Saratoga* when he noticed a loss of engine power, followed by smoke and flames erupting from under the engine cowling. He turned back to the airport, but smoke had filled the cockpit, obscuring his instruments and outside references. Opening the side vent window, he was able to keep the ground in sight. He saw he could not reach the airport and landed the Piper in a nearby field. He safely exited the aircraft with his handheld fire extinguisher and was able to douse the fire. The subsequent accident investigation revealed that there was a loose exhaust V-clamp and a distorted gasket at one of the exhaust joints. That allowed blow-by of the hot exhaust gases, which melted the fuel boost pump connection. Raw fuel was spewed into the engine compartment and caught fire. Just six flight hours before the accident, a mechanic had removed the exhaust system to rework a cylinder. NTSB concluded that the gasket had been distorted during the reassembly of the exhaust system, and it cited "maintenance personnel" as the probable cause.
- The pilot of a BE-55 (Baron) on the

ance Preflight

west coast was flying in an aircraft that had accumulated a total of three hours since one of its Continental engines had been overhauled. The pilot was cruising at 3,500 feet when that engine began to run rough. He decided on a precautionary landing at a nearby airport. As the Baron was touching down, the tower notified the pilot that the airplane was on fire. The pilot was able to stop the airplane and exit safely. Fire equipment at the airport extinguished the fire. Accident investigators found that the fuel pressure line had burned away and redirected fuel to the inside of the engine cowling. Further, investigators discovered that three cylinders on the right side of the engine had not been properly secured during the recent overhaul.

• Another pilot had to ditch his Piper Arrow in the Gulf of Mexico during a pleasure flight with another passenger when the pilot noticed a loss of engine oil and then the engine seized. The pilot and his passenger survived without serious injury and the Piper was later recovered. The investigation revealed that the oil line from the propeller governor to the engine nose case had failed at a bend from fatigue. Also, the two required support clamps for the line had not been installed. The oil line had been changed by maintenance personnel just eight hours before the inflight engine failure. If an oil line is not properly secured, it can vibrate and then break, which is what NTSB concluded happened in this case.

The relationship between pilot and mechanic is a critical one because a properly maintained aircraft is a vital element of a safe flight. The primary regulatory responsibility for seeing that an aircraft is properly maintained falls, first of all, on the owner or operator of the aircraft. FAR § 91.165 states that, "... each owner or operator of an aircraft shall have that aircraft inspected as prescribed ... and shall, between required inspections, have defects repaired as prescribed in Part 43." This, therefore, is the owner or operator's legal responsibility—to see that the required inspections are performed and that all defects are repaired during the intervals between inspections. Thus, if an aircraft should be involved in an accident or examined as part of a ramp check and it is discovered that a required inspection has not been performed, it is the owner or operator who will suffer the regulatory and legal repercussions. The pilot, of course, is the last resort for the determination of airworthiness before flight—any flight, whether the first after a major inspection or the 100th.

However, after all of the legal and regulatory responsibilities have been fulfilled, the owner or pilot of the aircraft finally has to turn the airplane over to a mechanic for the technological work necessary to ensure a safe flight.

And that is when the bonding of trust between pilot and mechanic can grow strong or wither.

When the mechanic finishes his or her work on an aircraft, he or she must "sign off" the job as complete and accurate. In the aircraft's logbook, the mechanic enters a description of the work done, signs his or her name, and indicates his or her certificate number. The average pilot, lacking a serious mechanical background, simply has to trust that the mechanic has accomplished the work correctly and completely. As noted above, this trust is usually justified, and the episodes recounted here are the exception rather than the rule.

The reasons for the competency and high professionalism of American aviation mechanics are many, but a primary reason undoubtedly is the FAA's certification process for maintenance airmen. The applicant for an A&P certificate must take a battery of written, practical, and oral tests and this only after he or she has graduated from an FAA-approved FAR Part 147 school or can show proof of at least 18 months of practical experience in aircraft maintenance. Approved schools typically require students to take some 1,800 hours of classroom and hands-on instruction. These are generally more stringent requirements than those for private or commercial pilot certification, and it has been said that the issuance of an A&P certificate is the pilot equivalent of an airline transport pilot certificate.

However, in spite of the high rate of competency among U.S. aviation mechanics, there is still that 5% accident rate caused by improper maintenance. If you, as a pilot, are involved in an accident within the parameters of that percentage, the 95% safety factor really means little to you. What it boils down to is that you have to choose a competent mechanic in whom you have confidence and trust. Choose an aviation mechanic like you would choose a surgeon. After all, your life, in both cases, is in a professional's hands.

Trust your mechanic—maybe even take him or her to lunch, but—

Don't be hesitant to check over your mechanic's work *after* he or she returns the aircraft to service. ■

MECHANICS, TAKE NOTE:

O'BRIEN'S AVIATION MAINTENANCE LAWS

1. Know thy aircraft!

2. Respect thy limitations, or pay for them!

3. When faced with an insurmountable task, read the instructions.

4. The most delicate component is the one you will drop.

5. Interchangeable parts won't!

6. The availability of a part will be inversely proportional to the need.

7. Metal remembers.

8. A dropped tool will do the most harm or land in the most inaccessible spot. (Also known as "The Law of Selective Gravitation.")

9. A failure will not appear until the job/part has passed final inspection.

10. A failsafe circuit will destroy others!

11. There is no such thing as a dead magneto, ignitor box, electrical circuit, or hydraulic system.

12. If you have time to do it over again, you had time to do it right the first time.

13. If you mess around with it long enough, it will break.

14. Probability of failure of a part or component is inversely proportional to the ease of replacement.

15. A reputation as a good mechanic is hard won but easily lost.

16. Any wire, tube, or sheet metal, cut to length, will be too short.

17. An expensive avionics system protected by a fast-acting fuse or circuit breaker will protect the fuse by blowing first!

18. Update your maintenance skills, so you can pay tomorrow's bills.

Once again, our thanks to William "Bill" O'Brien, an Aviation Safety Specialist in the General Aviation and Commercial Branch of the Aircraft Maintenance Division in FAA Headquarters, for his contributions.

The Right Seat

Instructors And Students Working Together For Safety

A pilot is the product of training and practice. But how many of these ingredients are necessary to assure that a pilot is truly safe? Demonstrating skills in a practical test can reveal a lot, but an accident is frequently the ultimate evidence of something wrong in the pilot's training, of some breakdown in the student-instructor relationship.

The relationship between a student and instructor approaches that of a parent and child. As in life we learn important, lifelong lessons from our parents, it is from the instructor that we learn our flying habits, good and bad. Instructors, especially newly certificated ones, experience much anguish about their judgements—when is it the right time to solo a student, to recommend someone for a certificate or rating. The instructor knows his or her awesome responsibility: that the student he or she has trained will go out to participate with everyone else in the national airspace system. Sometimes, something goes wrong. Hopefully, an instructor's mistakes—either personal or through his or her students—are minor and easily correctable, something that the instructor and student can treat as a mutual learning experience. There are many examples that we can learn from. The following accidents underscore the importance of the proper relationship between student and instructor and the proper attitude for an instructor.

- A 24-hour student had never flown a C-152 solo. He had been trained in a C-150 and had two hours in the C-152. There are several differences between the two models: the C-152 has knots displayed prominently on its airspeed indicator; the flaps extend 30° on the C-152 instead of the 40° on the C-150; and the approach speed is slightly higher. On his first trip solo around the pattern, the student made a fast approach and a hard landing. The aircraft wheelbarrowed, ran off the runway, and collapsed the nosewheel. The instructor who authorized the flight had not given the student a dual checkout in the C-152; in fact, the instructor had never flown with this student before authorizing the flight, in violation of FAR §61.87(d)(1).
- A student pilot arrived late for a scheduled dual period. Following a quick pattern and landing, the instructor hurriedly authorized the student to go solo. Performance by the student during this quick checkout was not the best. The rushed student did not feel confident but pressed on without speaking up to the instructor. On the first takeoff roll, with a 90°, 10-knot crosswind, the aircraft swerved off the runway, hit a snowbank, and flipped over.
- The 2,400-hour pilot on a multiengine checkout expected a simulated engine failure during climbout. During the takeoff roll, the instructor cut the left mixture at 10 to 15 mph below V_{mc}. The student thought the aircraft was being affected by a crosswind, so he rotated to find the yaw uncontrollable. The instructor tried to restart as the aircraft fell back to the ground, incurring substantial damage. This was the first multiengine student for the instructor. He had not demonstrated nor discussed the correct procedure for a rejected takeoff or his intention to simulate the exercise.

Here are a few more episodes that show that training has to be a gradual progression from the easy to the more complex tasks. Try

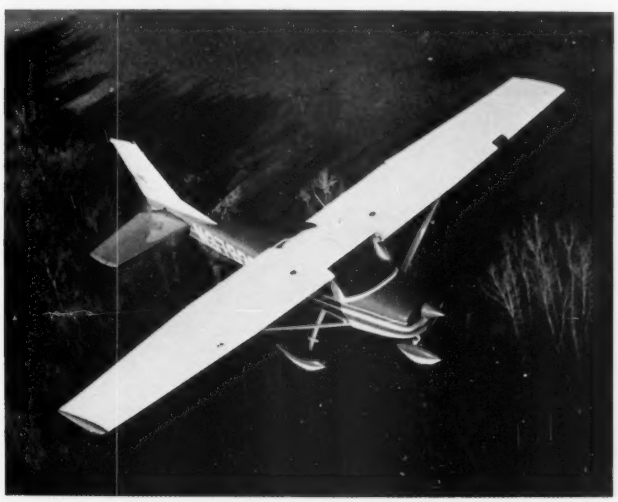
to speed up the process, and things do wrong. Read on —

- A 45-hour pilot had flown only from larger, hard-surfaced airports during his training. He decided to rent a flying club aircraft and go into a short, ranch strip only 30 feet wide. Although he was briefed on the narrow runway—the rise in the center and its short length—he was clearly a victim of the illusion that a shorter, narrower runway makes you think you are too high. On the approach he apparently overcompensated by levelling out high, floating 1,000 feet down the strip, and then stalling out 20 feet above the ground.
- A solo 23-hour student pilot, on a touch and go, let the aircraft swerve off the icy runway into a snowbank. The instructor learned a lesson: runway conditions suitable for experienced pilots are not necessarily safe for a student with *one hour* of solo time.

Flight training with a professional instructor does cost money, so some pilots try to do without. Many find it is a poor bargain—

- A 110-hour private pilot, flying a homebuilt aircraft for the first time, was caught in a high sink rate on final approach. The left gear collapsed on impact with the runway. The pilot did not have a current biennial flight review nor had he flown for a long period of time.
- A 300-hour private pilot attempted to give his brother, who had a total of nine hours, some illegal dual instruction. Neither was familiar with the newly purchased aircraft. After a steep diving approach, the aircraft touched down hard and bounced 2,500 feet down a 3,500-foot strip. During an attempted go-around, the aircraft hit a tree, fell to the ground, and burst into flames. Only one brother escaped from the burning airplane.

A note to instructors on "touch and go's" —let's think about the validity of the touch-and-go exercise, particularly in the pre-solo phase. Many instructors want to get as much meaningful activity in an hour-long session as possible and sometimes think the more the better—especially when trying to get a student ready for that first solo landing. Using touch-and-go's you can clearly get more landings per lesson than when each one culminates with a full-stop and taxi back. However, consider what happens to a student in a typical touch-and-go scenario. It starts with a takeoff during which the student encounters the standard difficulties—directional control, airspeed control, ground track, etc. Notwithstanding the problems associated with flying a correct pattern, base leg, etc., he or she is soon faced with the maneuver which requires the utmost in motor skill—the landing. The student's mind is probably still back on the takeoff leg, but now the instructor is really going to complicate matters. After coaching the student through an erratic round out, touchdown, and short rollout, we have him or her adding full power and rapidly transitioning back to the takeoff phase and its associated problems. Stop and think about what must be going on in the student's head. There are not many students at the presolo stage who can mentally assemble, analyze, and correct their errors under these conditions. Asking things of a student that are beyond that student's current abilities can undo already learned material



and set up mental blocks against future learning. Learning does not take place when a student is frustrated. When an instructor continually makes the learning situation frustrating and unhappy for a student, resentment can build up against anything the instructor has to offer. There is a place for touch-and-go's and other complicated maneuvers in advanced training, but they should not be emphasized in the presolo phase. One pattern culminating in a full stop landing and then allowing a few minutes' time for critique and mental preparation for the next circuit can be worth a full hour of rapid-fire touch-and-go's.

Deciding when to take over control has long been a dilemma for an instructor. After all, the goal of flight instruction is to have the student recognize potentially dangerous situations and take corrective action. Sometimes it is difficult for the instructor to determine what is too much too soon or not enough too late. Continually saying, "I've got the airplane!" does nothing to build a student's confidence nor does any learning take place. However, sitting idly by expecting the student to fix things when he or she is expecting you to fix things does not work either. What is needed is a happy median, and there is no set of rules to apply to all students; each one must be handled individualiy.

Sitting in a "pranged" PA-28, one instructor had several afterthoughts about his teaching techniques. During a checkout with a newly certificated pilot, he had tried to prompt the pilot out of trouble rather than take control. The pilot could not keep lined up on the approach in a stiff crosswind and got too low. The aircraft was less than 50 feet off the ground before the instructor said, several times, "Add power!" The aircraft struck the ground 800 feet short, knocking off the nose gear. Instructors, remember, even if the student is a certificated pilot, it is only fair to demonstrate a crosswind landing rather than just trying to tell him or her how to do it.

Yet, there are times when taking over the controls can create problems, too. During a practice emergency landing, the student pilot pulled the nose up in an attempt to stretch the glide to clear a powerline. So, the instructor demonstrated "how we can clear an obstacle by putting the nose down, increasing the airspeed, and then pulling up over the obstacle." They cleared the powerline all right, but, nose high, the airplane mushed to the ground under full power. What the instructor proposed was to abandon the best glide speed for the sake of a "zoom" maneuver. Best glide speed is just that. Thinking otherwise is just asking for trouble—although the subject always creates some interesting hangar flying sessions.

We have looked at some common training situation accidents that we all, students and instructors alike, can profit from.

Regardless of whether you are a student, flight instructor, or ATP, if you fly you are a candidate for training anytime. Learning in the cockpit is not and should not be only for the student. ■

Written by Al Milana, Accident Prevention Specialist, Lincoln, NB, for Pireps, *official publication of Nebraska Department of Aeronautics.*

After two decades of startling successes and continual growth, aviation in America was stagnating as the 1930's approached. The U.S. Government saw no need to update its antiquated fleet of aircraft. After all, there was no reason to update it: Since World War I was the war to end all wars, a modern "air force" was not needed. It was up to private industry to generate new, innovative aircraft designs, but after the 1929 stock market crash industry needed a big incentive to risk hard-to come-by money that could so easily be lost. Enter the Bendix Air Race.

In 1897, 16-year-old Vincent Bendix ran away from his Illinois home determined to make his fortune. After several years racing motorcycles and studying engineering at night school, he formed an automotive company in 1907. His mechanical ability and inquiring mind made him question why handcranking was the only way to start a car. So, he developed a spring-driven link between the starter motor of his invention and a flywheel. From that time on his success was guaranteed. He continued to invent and improve other engineers' inventions and cashed in on it. By the time of the stock market crash, Vincent Bendix and the Bendix Corporation held over 5,500 patents pertaining to every mode of transportation. With his dedication to technological advancements, Bendix seemed the natural choice to promote a new air race—at least Clifford Henderson thought so.

Clifford Henderson was the originator and promoter of the National Air Races. However, he realized that this event was little more than an aerial display. A real air race demanding maximum participation from every facet of aviation was needed. Henderson approached Bendix with the race idea, a drawing of the trophy, and a $15,000 request (which the National Air Race Committee would match) for the prize. Bendix was intrigued with the idea but disliked the trophy and told Henderson to come back when he came up with a design more in keeping with the spirit of the race. Henderson took him at his word and another design was submitted to and approved by Bendix.

With prize money in hand, Henderson scheduled the first race, from Los Angeles to Cleveland, for the fall of 1931. According to Henderson it was to be "an annual free-for-all cross-country air race, something that will force airplane designers, builders and pilots to really get down to business."

The weather was perfect for the first race. Eight airplanes were lined up for takeoff—six Lockheeds, a Travel Air *Mystery S*, and a Laird *Super Solution*. The perfect weather did not last long—cold fronts were sweeping down across the country. The pilots had to prove their skills as navigators, meteorologists, and flight-planners—dead reckoning was the order of the day.

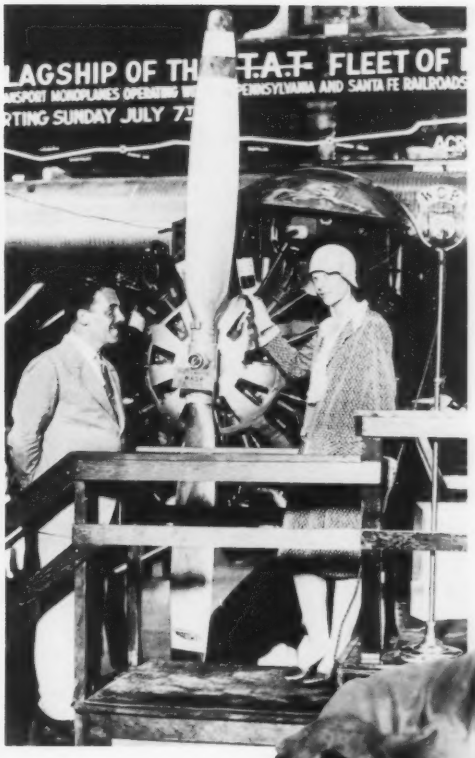
The contest ended nine hours and 10 minutes later when Jimmy Doolittle crossed the finish line. However, he gassed up and took off again, heading towards New York and a chance to beat the standing transcontinental record. Two hours and one minute later he beat the old record by more than one hour. He had averaged 223 mph, a staggering speed for that era.

The advent of World War II suspended the Bendix Air Race from 1940 to 1945. When the race resumed in 1946, the complexion of the race had changed. In 1946, P-51's (war surplus *Mustangs*) took the first five places with the winner averaging 435.5 mph. Compare that to the 1939 winning speed—282 mph in a Seversky P-38. The era of the reciprocating engine competition was over; sleek products of war technology ruled the race when a class for jets added. By 1951 the Bendix Air Race was restricted solely to jets.

1962 heralded the end of the race. Two B-58 *Hustlers* flew the original route all the way to New York as Jimmy Doolittle had done 31 years before—in two hours and 56 seconds, beating Doolittle's fledgling record by *over nine hours*. The military crew then returned immediately to Los Angeles. The entire trip (coast to coast to coast) took four hours, 42 minutes, 32 seconds at an average speed of 1,214.71 mph. A far cry from Doolittle's average of 223 mph. Of course, Doolittle did not leave in his wake a 40 mile-wide trail of "shattered glass and nerves" as the *Hustler* did with its sonic boom.

Ironically, the Bendix Air Race engineered its own demise. The jet aircraft were flying too high and too fast to attract the public's fancy as the propeller driven airplanes had done. The races had, however, achieved far more than its originator had ever envisioned in the development of safer (evidenced by the race's safety record), faster, and more efficient aircraft. The time had come to give way to a new race, one which had actually delayed the start of the last Bendix Race. A craft called *Friendship 7*, carrying a Marine pilot named John Glenn, had just done its own circle route—around the earth. ■

The Travel Air Mystery S was considered the prime contender to win the first (1931) Bendix Air Race. But the Mystery did not stand a chance against Matty Laird's Super Solution flown by Jimmy Doolittle.

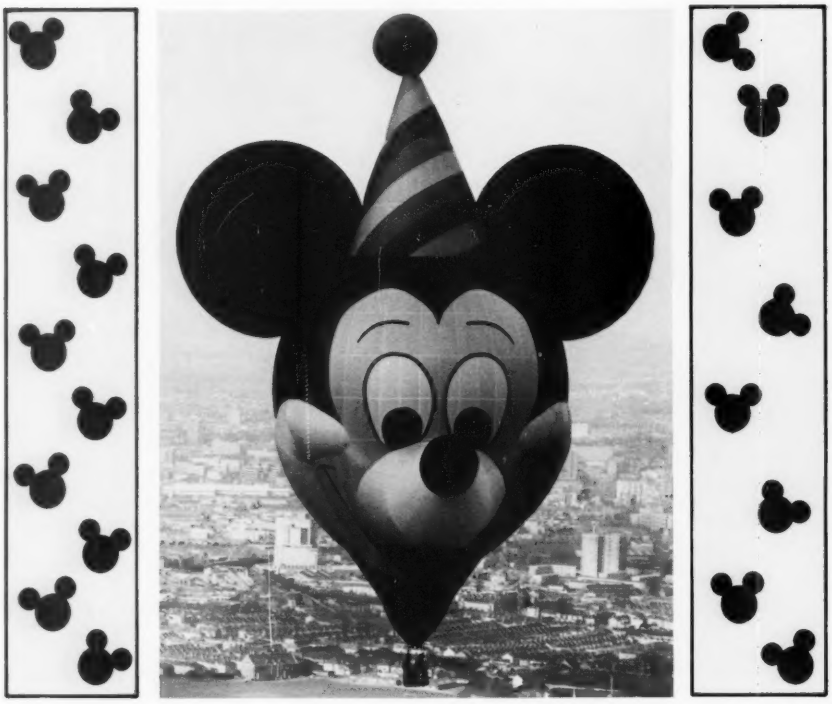


Amelia Earhart flew in several of the Bendix Air Races but never won.

1932 winner Roscoe Turner, known for his flamboyant uniforms and his pet lion, almost did not get to start. When warned by his rival of a process server's presence at the race, Turner quickly donned a pair of coveralls and got into his plane for takeoff.

First and last—winners that is. Seated center is General James (Jimmy) Doolittle, USAF (ret.) who won the first race (1931) at 223 mph in the Laird Super Solution. He is surrounded by the B-58 supersonic bomber crew who won the last race (1962) at 1,214.71 mph. Seated left: Lt. Col. Bob MacDonald, USAF (ret.), navigator; seated right: Lt. Col. Bob Sowers, USAF (ret.), aircraft commander; standing: Maj. John Walton, USAF (ret.), defensive systems operator.

The 1936 race had a $2,500 prize for the first woman to finish. Louise Thaden and Blanche Noyes had not planned to join the race but were offered the use of a Beech Staggerwing with long distance tanks. They did not finish last as they thought. They not only won the woman's prize—they won the race!



WHO'S THE LEADER OF THE CLUB? The newest addition to the unusual balloons fleet is Minnie Mouse's significant other, Mickey. This eye-catching balloon is currently on a nation-wide promotional tour celebrating the 60th birthday of Walt Disney's most famous and lovable creature.

NEW INSPECTOR RATING SYSTEM

FAA is adopting a new system of rating and ranking prospective aviation safety inspectors. The qualification standards have also been significantly changed. As a result, the current inventory of applications is being eliminated, and FAA is accepting new ones.

New applicants can apply for seven distinct inspector areas. There are three each in both general aviation and air carrier: Operations, Maintenance, or Avionics. The seventh position is a Manufacturing Inspector. All seven positions are rated as GS-1825-9/11/12.

Anyone who wants further information, or who wants to obtain the job announcement and appropriate application forms, should contact:

DOT/FAA
Mike Monroney Aeronautical Center
Special Examining Division, AAC-80
P. O. Box 25082
Oklahoma City, OK 73125

ACPI DEVELOPS POLICE MANUAL

The Aviation Crime Prevention Institute in Frederick, MD has produced a manual designed to educate police officers who may not be familiar with aircraft equipment and technology. The new manual, the Aviation Identification Manual for Police Officers, provides brief explanations of aircraft types, equipment, terminology, and aircraft theft trends. There is a glossary of aviation terms and illustrations of the most common aircraft as well as explanations and illustrations of aircraft avionics.

The Federal Bureau of Investigation and many other federal, state, and local law enforcement agencies—particularly in areas where aircraft thefts have been directly linked to illegal drug importation—have obtained copies and are training their officers based on the manual. ACPI hopes to have a video version available soon.

Copies of the manual are free with a $2.50 shipping and handling fee from the Aviation Crime Prevention Institute, P. O. Box 3443, Frederick, MD 21701. ACPI is currently developing an aviation crime prevention manual for pilots, aircraft owners, and airports to use for security training.

LATEST FAA PUBLICATIONS

AIRWORTHINESS DIRECTIVES

FAA's "Summary of Airworthiness Directives", Advisory Circular 39-6M, explains the system for publishing those directives on paper or microfiche. A current price list, order form and instructions for ordering is included. Free from the Distribution Center, M-443.2, Washington, D.C. 20590.

PROBLEM AIRPORTS, TERRAIN

Airports and routes where air carrier pilots require special qualification to operate are listed in Advisory Circular 121.445-1B, "Pilot-in-Command Qualification for Special Area/Routes and Airports, FAR 121.445".

Although the rule is directed at air carrier operators, other pilots may be interested in reviewing the list of Airports and Area/Routes and their associated problems. Airports in Europe, Asia and South/Central America are covered, as well as U.S. airports. Free from the Distribution Center, DOT M-443.2, Washington, D.C. 20590.

INSPECTION AND REPAIRS

Advisory Circular 43.13-1A, "Acceptable Methods, Techniques and Procedures, Air Inspection and Repair," has been revised. The new revision, identified as Change 3 contains 168 pages. Change 3 can be purchased from Government Printing Office (GPO) Washington, DC 20402 for $9.00. The Federal Stock Number is FSN-050-007-00795.

DESIGNATED EXAMINERS

A national directory of Designated Mechanic Examiners (DME's) and Designated Parachute Rigger Examiners (DPRE's) as of December 22, 1987, is available. DME's conduct the oral and practical tests required for issuing FAA airframe or power plant certificates. DPRE's carry out oral and practical examinations for applicants seeking parachute rigger certification.

Copies of this advisory circular, AC 183-32F, are available from the DOT Distribution Center, M-443.2, Washington, D.C. 20590.

MODE C VIDEO AVAILABLE

The expanding role of the altitude reporting transponder (Mode C) in maintaining safe separation between aircraft in the radar environment is displayed in a new video tape produced by FAA for public distribution. The eight-minute tape may be borrowed for showing at pilot safety meetings from Accident Prevention Specialists and Flight Standards District Offices or Flight Service Stations. See a related article on Mode C on page 3 of this issue.

• Complex Instruction vs Practice

While working toward my commercial license, I came upon a question that has yet to be answered satisfactorily. In FAR 61.129 (b)(1)(ii), it states that an applicant for a commercial pilot certificate must have "10 hours of flight instruction and practice given by an authorized flight instructor in an airplane having retractable landing gear, flaps, and a controllable pitch propeller." Further on in sections 61.129(b)(2)(i) and (ii) various references occur to "instruction" but without "and practice" being added.

So the question is, must all of the minimum 10-hours be in what are commonly known as "complex" airplanes be with a flight instructor, or may some of that time be solo?

The question was raised when I received five hours of instruction at a local FBO, flying a Cessna 177RG. According to their insurance, I could fly that airplane without an instructor for the rest of the five hours needed for the commercial license.

Dewitt P. Whittington
Richmond, VA

The required 10 hours in a complex aircraft (FAR 61.129) may include as much solo time as your instructor finds acceptable in view of your experience and competence.

The terms "flight instruction and practice" in Section 61.129(b)(1)(ii) provide for both dual and solo flight time because it was determined that varying combinations of dual and solo time would be satisfactory for acquiring this experience.

• Night Flight

During what time period is night flight logged? Do you log night flight between sunset and sunrise or the period beginning one hour after sunset and ending one hour before sunrise, as suggested by FAR 61.57(d).

J. Christian Haesloop
Rock Stream, NY

Night flight, for purposes of satisfying the PIC recency of experience requirements for carrying passengers under Part 61.57(d), is defined by that rule: The period beginning one hour after sunset and ending one hour after sunrise.

Night flight for other purposes means the time between the end of evening civil twilight and the beginning of morning civil twilight, as published in the *American Air Almanac*, converted to local time.

• SVFR Clearances

With reference to the March/April 1988 Forum page and Mr. Ferguson's request for a special VFR clearance to practice touch and go's within a control zone—which was denied—I don't feel you adequately answered the question.

I understand that SVFR is available to help pilots exit an airport in a control zone where the ceiling is below one thousand feet and visibility is less than three miles. When a pilot can stay clear of clouds and maintain one mile visibility he may be issued a SVFR clearance.

To my knowledge SVFR is not intended for practice in the control zone or to enable VFR pilots to enter clouds, but just to exit the control zone.

W.M. Wheeler
DeRidder, LA

As indicated in the Airman's Information Manual (C4–S4–2) a VFR pilot may request and be granted a clearance to "enter, leave, or operate within most control zones in special VFR conditions, traffic permitting and providing such a flight will not delay IFR operations."

"Special VFR conditions" means weather that is less than the VFR minimums but affords at least one mile ground visibility if taking off or landing, and one mile flight visibility elsewhere in the control zone. Helicopters are excepted from the visibility minimums; they are only required to remain clear of clouds. All SVFR flights must remain clear of clouds.

• Preventive Maintenance

I have only 200 hours as a private pilot (ASEL). I just purchased a 1965 Cessna 172. To me the regulations seem a little vague about what a lay person can repair. It is my understanding that you can repair things that do not affect airworthiness.

For example, could I remove and repair a front wheel shimmy damper by replacing the O-rings and fluid then putting it back on with the original nuts and cotter pins? If I did this and entered it in the repair logs, is that okay?

James E. McCullough
Meadville, PA

No, it is not permissible for anyone without a mechanic certificate with an airframe rating to replace the "O" rings and fluid on landing gear.

Appendix A, paragraph (c) of FAR Part 43 lists the items that are considered preventive maintenance, "... provided it does not involve complex assembly operations." Pilots may perform preventive maintenance. Records of preventive maintenance must be maintained in accordance with FAR § 91.173(a)(1).

FAR Part 43, Appendix A, paragraph (c) indicates the following preventive maintenance on landing gear may be accomplished by a pilot:

- Removal, installation, and repair of landing gear tires.
- Replacing elastic shock absorber cords on landing gear.
- Servicing landing gear shock struts by adding oil, air, or both.
- Servicing landing gear wheel bearings, such as cleaning and greasing.
- Replacing defective safety wiring or cotter keys.
- Replacing wheels and skis where no weight and balance computation is involved.

FAA AVIATION NEWS welcomes comments from our readers. No anonymous letters will be used, but names will be withheld on request. Address: FAA AVIATION NEWS, AFS-810, Washington, D.C. 20591.

• Anti-collision Lights

I keep getting conflicting information about requirements for anti-collision lighting. I have a '49 Cessna 170A and would like to add an approved anti-collision (strobe) system. Do I understand correctly that there are no requirements for anti-collision lighting for pre-1957 certificated aircraft?

Also, what are or where do I find the visibility, etc., requirements for an anti-collision lighting system to be added to my airplane now?

Larry Elms
Longview, TX

Your understanding about anti-collision lighting for pre-1957 certificated aircraft is in error. FAR 91.33(c)(3) requires an anti-collision light on *all* U.S. registered civil aircraft in order to be flown at night. In your case, the lighting must conform to the requirements of FAR Part 23.1401.

The visibility and other technical standards described in that section would also apply to the installation of an additional lighting system. FAA Advisory Circular, AC 20–30B, provides additional guidance for the installation of anti-collision lights.

• Slip of the Pen

I believe you have mislabelled figure 5-20 in the current FAA Instrument Handbook (AC 61-27C). The instrument is indicating a skid, not a slip. Conversely, Figure 5-21 is showing a slip, and not skid.

Second item. Your Flight Training Handbook (AC 61-21A) states that power-on stalls are to be executed at a bank angle of 15° to 20°. On the other hand, Section 1-18 of the Private Pilot Training Standards says it should be done at 20°, plus or minus 10°. Which, if either, is right?

Name Withheld
Montgomery, AL

You are correct about the mislabelling of Figures 5-20 and 5-21 in the Instrument Handbook. The error will be corrected in a future revision.

On the second item, the standards in the new Private Pilot Practical Test Standards supersede the information contained in the Flight Training Handbook. Information in AC 61-21A will be updated to agree with the PTS in a future revision.

Thank you for giving us the benefit of your eagle eyes.

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Runway Incursions

(Continued from p. 7)

and construction on the ground is becoming most troublesome. It is very difficult for pilots and controllers to see and track the many, different-sized airplanes moving on the airport's surface on clear days. Add weather and/or darkness, and the problem can, literally, explode.

A recent investigation into 26 such incidents shows that both pilots and controllers must make some contribution to lower exposure to these potentially lethal situations. Start your own ground safety awareness by noting the following suggestions (Note also that most of them are good ideas in the air, too.):

- Always use the proper phraseology when communicating with air traffic control.
- Read back clearances with restrictions and numbers (altitude, heading, runway number, etc.). If there is a misunderstanding, do not hesitate to request clarification. It is a sign of the professional pilot.
- Keep an uncluttered cockpit; avoid idle chitchat; listen to the other traffic on your frequency.
- If your aircraft is moving, all eyes inside should be watching outside.
- Control your taxi speed when approaching any other taxiway or runway.
- Be ready when cleared for takeoff; do not move onto the active runway while trying to finish the checklist. When you hesitate in position, you destroy the timing of every controller and pilot who anticipates your action.

As our skies fill, so also do the surfaces of our airports. There is a change in the air and on the ground. We cannot return to the days of the "bold, free spirit" of yesteryear, even though we may long for those days in our hearts. The free spirits who cannot change are no longer welcome in our ranks. ■

Editor's Note: We would like to add that uncontrolled airports are also experiencing more and more traffic, congestion, and construction. Following Mr. Doster's suggestions is especially important on a single, two-way taxiway or at an airport with no taxiway where pilots have to back-taxi on the runway. Position reporting on the CTAF is good, cheap life insurance. No one wants to see another Tenerife on a grand or small scale.